CLAIMS

1. A method for manufacturing a highly-laminated magnetic inductor core, the method comprising:

depositing at least a first layer of a ferromagnetic material;

depositing at least a first layer of a sacrificial conductive material;

depositing a support structure formed of a ferromagnetic material; and

removing the sacrificial conductive material, thereby leaving the at least first layer of ferromagnetic material mechanically supported by the support structure.

2. The method of claim 1, wherein the depositing is performed by electrodeposition.

3. The method of claim 2, wherein the steps of electrodepositing the at least first layer of the ferromagnetic material and the at least first layer of the sacrificial conductive material are performed in a repetitive and stacked manner.

4. The method of claim 1, further comprising:

creating a core mold atop a substrate, wherein the core mold is shaped such that the deposited materials are formed in a preferable manner; and

removing the core mold once the support structure is electrodeposited.

5. The method of claim 1, wherein the support structure is U-shaped.

6. The method of claim 1, wherein the ferromagnetic material is permalloy.

7. The method of claim 1, wherein the sacrificial conductive material is copper.

8. The method of claim 1, wherein the at least first layer of ferromagnetic material has a thickness on the order of or less than the skin depth of the material at a given operating frequency.

9. The method of claim 1, wherein the step of removing is performed by selective etching of the sacrificial conductive material.

10. A method for manufacturing an integrated inductor, the method comprising:

micro-molding and electroplating a conductive material atop a substrate to form a bottom portion of a conductor coil;

depositing and patterning a layer of photosensitive epoxy atop the bottom portion of the conductor coil;

sequentially electrodepositing at least a first layer of a ferromagnetic material and at least a first layer of a sacrificial conductive material atop the photosensitive epoxy;

electrodepositing a support structure formed of a ferromagnetic material;

selectively etching the sacrificial conductive material, thereby leaving the at least first layer of ferromagnetic material mechanically supported by the support structure which forms a magnetic core for the integrated inductor;

depositing a layer of epoxy resist over the magnetic core;

patterning the epoxy resist to form vertical electrical vias for the vertical portions of the conductor coil;

depositing a layer of photoresist over the epoxy resist;

patterning the photoresist to form horizontal spaces for a top portion of the conductor coil; and

electrodepositing a conductive material filling the vertical electrical vias and the horizontal spaces, thus forming the conductor coil integrally wrapped around the magnetic core.

11. The method of claim 10, wherein patterning the layer of photosensitive epoxy comprises patterning the photosensitive epoxy to form electrical vias providing electrical access to the bottom portion of the conductor coil.

12. The method of claim 11, further comprising:

spin-casting and patterning a thin photoresist layer to clog the electrical vias thus protecting the bottom portion of the conductor coil prior to selectively etching.

13. The method of claim 11, wherein the vertical electrical vias are patterned to match up with the electrical vias that provide electrical access to the bottom portion of the conductor coil.

14. A magnetic inductor core comprising:

a first stack of ferromagnetic layers spaced apart a first predetermined distance;

a second stack of ferromagnetic layers spaced apart a second predetermined distance; and

a ferromagnetic support structure mechanically supporting the first and second stack.

15. The magnetic inductor core of claim 14, wherein the support structure is U-shaped, and wherein the support structure is formed in the center of the magnetic core such that the first stack is supported from a first side of the U-shaped support structure and the second stack is supported from a second side of the U-shaped support structure.

16. The magnetic inductor core of claim 14, wherein the magnetic core is substantially square-shaped.

17. The magnetic inductor core of claim 14, wherein the height of each ferromagnetic layer is on the order of the skin depth of a utilized ferromagnetic material at a given operating frequency.

18. The magnetic inductor core of claim 14, wherein the ferromagnetic layers are formed of permalloy.

19. The magnetic inductor core of claim 14, wherein the first predetermined distance is substantially the same as the second predetermined distance.

20. An integrated inductor comprising:

a magnetic inductor core comprising:

a first stack of ferromagnetic layers spaced apart a first predetermined distance;

a second stack of ferromagnetic layers spaced apart a second predetermined distance; and

a ferromagnetic support structure mechanically supporting the first and second stack; and

an integrated conductor coil microfabricated around the magnetic inductor core.

21. The integrated inductor of claim 20, wherein the support structure is U-shaped, and wherein the support structure is formed in the center of the magnetic core such that the first stack is supported from a first side of the U-shaped support structure and the second stack is supported from a second side of the U-shaped support structure.

22. The integrated inductor of claim 21, wherein the height of each ferromagnetic layer of the magnetic core is less than the skin depth of a utilized ferromagnetic material at a given operating frequency.

23. The integrated inductor of claim 21, wherein the ferromagnetic layers are formed of permalloy.

24. The integrated inductor of claim 20, wherein the first predetermined distance is substantially the same as the second predetermined distance.